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ABSTRACT

To assess the educational effectiveness of open plan schools, a standardized test of reading, spelling, and mathematics achievement was administered to grade 2 pupils in two open plan and ten conventionally constructed schools. Scores on all three measures, plus the average attained scores on an academic ability test, were not significantly different between students in the two types of school buildings. (Author)

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Studies Of Open Education

No. 6 Reading, Spelling, and Mathematics Achievement of Grade 2 Pupils in Open Plan and Architecturally Conventional Schools

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STUDIES OF OPEN EDUCATION

Titles in Series:

No. 1 The Open Plan School as a Response to Change (Jan. 1970)

No. 2 A Day in the Life: Case Studies of Pupils in Open Plan Schools (May 1970)

No. 3 Anatomy of Open Education: A Barebones Summary of Its Assumptions as Related to Practices in Elementary Education and an Overview of Its Accomplishments (revised Sept. 1970)

No. 4 "Open Education: A Selected Bibliography" (revised Oct. 1970)

No. 5 Reading and Mathematics Achievement of Grade 1 Pupils in Open Plan and Architecturally Conventional Schools (Sept. 1971)

No. 6 Reading, Spelling, and Mathematics Achievement of Grade 2 Pupils in Open Plan and Architecturally Conventional Schools (Mar. 1973)

Research Office

Division of Planning and Development York County Board of Education

READING, SPELLING, AND MATHEMATICS ACHIEVEMENT OF GRADE 2 PUPILS IN OPEN PLAN AND ARCHITECTURALLY CONVENTIONAL SCHOOLS

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SYNOPSIS

In the spring of 1972 a standardized test of reading, spelling, and mathematics achievement was administered to grade 2 pupils in two "open plan" and ten conventionally constructed schools. An academic ability, ("IQ") test was also administered. The average attained scores on the IQ test and on all three measures were not significantly different when the open plan and the other schools were compared. Marginal differences existed in reading and spelling and favoured pupils of the open plan schools. Pupils in the non-open plan schools recorded marginally high ability scores. This is the second year of a three-year longitudinal study of academic achievement of this group of approximately 675 students. These results resemble the year one findings.

DETAIL

(a) Purpose of this Study

Since 1969, when the County's first open plan elementary schools began operation, five interrelated studies have been launched (by the board or co-operatively with external agencies) in an attempt to assess the educational effectiveness of the new open plan schools.

These studies seemed necessary for several reasons. Each of the four open plan schools had been designed by a different public school board prior to their amalgamation into a county board in 1969. The new board and its

administration could not immediately say whether "open plan" involved anything more than architectural innovation. There was a need to clarify the educational nature of "openness" and to determine to what extent "open education" teaching strategies prevailed in both the newer and older schools of the county.

It seemed desirable to identify the behavioral outcomes one might expect of open education programs and to design further research to determine whether objectives were being met. It also seemed essential to determine whether, in striving for their particular goals, open plan schools were offering a less effective program, as judged by "traditional" yardsticks (such as achievement in reading and mathematics skills), when compared to the programs in other schools which resembled them in most major particulars excepting architecture.

In 1969-1970 the first titles in this present series were published. These works helped to define the nature of open education, both at theoretical and practical levels. Case studies of pupils at all elementary grade levels in both open plan and matched "control" schools were conducted, for instance. In the spring of 1970 it was possible to report to the board that pupils in open plan schools were, in the opinion of the observers (public school principals), more likely to be allowed to initiate learning activities, to be given and to put to good use some responsibility for their own learning, and to participate in cooperative planning with teachers than were pupils in the matched "conventional architecture" schools. These case studies also showed that many "open education" concepts and practices were embodied in the programs of schools with conventional architecture.

In the autumn of 1970 the board also authorized investigations into other dimensions which might distinguish open plan from the other schools: (1) into differences in creativity and curiosity; (2) into differences in human (moral) values; and (3) into differences in "expectations" held by pupils and staff. Interim reports on (1) and (2) were received throughout 1971 and 1972, with "final" reports due throughout 1973-1975. A "final" report on the "expectations" study may be available before the end of this school year.

(b) Limitations of this Study

It must be emphasized that any single study in this series touches upon a necessarily limited area of concern. Many outcomes are desired from any school program. Reading, spelling, and mathematics skills as measured in a standardized test are certainly basic, but they may not necessarily represent the highest priority for all grade 2 teachers. Depending on their clientele, it may be more important for teachers to stress activities which foster personal and social adjustment, to encourage articulateness even at the temporary expense of correctness, to work at word attack skills rather than paragraph comprehension, and to arrange opportunities for handling concrete materials rather than abstract mathematical concepts.

In addition, it is likely that for some if not all pupils a cognitive abilities ("IQ") battery plus an achievement test battery is a lot of testing even when spread over a month. When the duration of the testing exceeds the interest span and when a pall effect supplants the initial interest in the tests, the task increasingly becomes a test of perseverance rather than of ability or achievement.

What is true of pupils may also be true, presumably to a lesser degree, for the teachers. They not only administered the tests, but scored them, converted the raw scores, calculated composite scores, and entered the composite scores for each pupil on each battery on class record sheets. Over 750,000 mental and manual operations were required and there was thus ample opportunity for human error. The few spot checks that were made indicate that some errors were made but that the incidence was about the same across all schools.

Longitudinal studies always run the risk of "attrition," the loss of pupils during the life of the study due to transfers out of the school, etc. The companion problem is the presence of "transfer-in" pupils whose previous experience was under a different style (e.g., from "traditional" to an "open" setting). "Attrition" is negligible to date. "Transfer-ins" have been more substantial and proportionately greater (so far) in the open plan schools. The cumulative effect over the three years of the study may present a problem.

At this juncture, the limitations are more by way of potential than real contaminants of the study. The elimination of the ability battery in 1972-73 (as originally planned) and the machine-scoring of the achievement tests should help keep the limitations to a minimum.

(c) Method

Two test batteries were used, both being the next level of the tests used with these pupils when they were in grade 1 (1970-71), viz,

(i) The Canadian Cognitive Abilities Test (1970 ed.), Primary 2, Form 1 (hereafter referred to as CCAT),

(ii) The Metropolitan Achievement Tests (1970 ed.), Primary 2, Form F (hereafter referred to as MAT).

Both these group-administered, "paper-and-pencil" tests were selected as suitable for use at the grade 2 level by a York County committee. The CCAT has Canadian norms (1970) while the MAT has U.S. norms (1970).

The whole CCAT battery was administered but only the reading, spelling, and mathematics tests (a total of seven) were given to approximately 150 pupils in two open plan schools, to about 535 pupils in 10 schools chosen as "controls" for the two open plan schools, and also to some 375 pupils in 6 other York County schools. Almost 95 per cent of the grade 2 pupils selected for this project took all the tests.

The 10 conventional architecture or "control" schools were selected giving due regard to factors which make for comparability (e.g., size of school enrolment). Seven were geographically proximate, sharing an attendance boundary with an open plan school (hence having generally similar historical, social, and economic conditions). The three other control schools resembled the open plan schools in one or more significant dimensions. Six other schools located about the county participated voluntarily. The scores of their grade 2 pupils helped to establish tentative county mean scores for the CCAT and MAT batteries.

The open plan schools and their controls cannot, in the strictest sense, be said to be matched on more than a few variables. A study in this series (see A Day in the Life, 1970) sought to determine the equivalencies of teacher competencies and experience, school facilities and resources, between open plan and other county schools. From that effort it was concluded that it is just not

possible, by matching, to do more than reduce by two or three the number of major factors which might contribute to differences in achievement.

(d) Findings

As with the grade 1 pupils in 1970-71, the test score data were treated in the three ways which can logically be justified: (1) each open plan school compared with its specific control schools; (2) the two open plan schools jointly with all the controls; (3) the scores of the two open plan schools, singly and jointly, compared with the mean scores of all the 18 schools tested at this time.

Once again, as in the previous year, it really did not matter which approach was used to compare the open plan and their control schools, the end result being very much the same. That is, there were marginal differences which were neither practically nor statistically significant. Once again, the great variance within groups was found. This variance comes into play when the statistical test of significance is applied and causes us to recognize a strong possibility that the observed mean differences between groups is attributable to chance factors.

Only one statistically significant difference emerged from the analyses. The mean average IQ of the open plan grade 2 pupils (105) proved to be significantly lower than the mean IQ of the total grade 2 population (of which they constituted 14 per cent) tested ($p = .05$). No conclusion need be drawn from this: this is essentially the same situation as was observed last year. All IQ scores compare favorably with the Canadian norm (100) and the expectations we might reasonably hold for the communities involved.

The results have been tabulated in two ways. Table 1 groups the results by school type while Table 2 pairs each open plan school with its controls.

TABLE 1: ABILITY AND ACHIEVEMENT OF GRADE 2 PUPILS IN OPEN PLAN AND ARCHITECTURALLY CONVENTIONAL SCHOOLS (GROUPED BY TYPE)

School Type	No.	Tested[1]	Mean IQ	Mean Achievement[2] Reading	Spelling	Mathematics
Open Plan	2	142	105	2.9	3.1	2.8
Conventional	10	526	108	2.8	3.0	2.8
All County	18	1034	109	2.9	3.1	2.9
Test norms	-	-	100	2.6	2.6	2.7

1 Excludes incomplete batteries, i.e., due to pupil absences.

2 Scores expressed as grade equivalents. Reading score is a composite of the vocabulary and comprehension tests; mathematics score is a composite of the math. concepts, computation, and problem solving tests.

TABLE 2: ABILITY AND ACHIEVEMENT OF GRADE 2 PUPILS IN OPEN PLAN AND ARCHITECTURALLY CONVENTIONAL SCHOOLS (PAIRED)

School	No. Tested[1]	Mean IQ	Mean Achievement[2] Reading	Spelling	Mathematics
Open Plan "A"	100	105	2.9	3.1	2.6
"A's" Controls	243	108	2.8	3.0	2.9
A-1	103	104	2.6	2.8	2.8
A-2	59	112	2.7	3.0	3.1
A-3	39	108	3.3	3.7	3.0
A-4	32	107	2.6	2.6	2.5
A-5	10	112	3.5	3.6	3.1
Open Plan "B"	42	104	2.9	3.0	3.1
"B's" Controls	283	108	2.8	3.0	2.8
B-1	52	108	2.7	2.9	2.6
B-2	49	108	2.8	3.2	2.8
B-3	69	108	2.9	3.0	2.7
B-4	66	114	3.1	3.3	2.9
B-5	47	101	2.5	2.5	2.8

1 Excludes incomplete batteries, i.e., due to pupil absences.

2 Scores expressed as grade equivalents. Reading and mathematics are composites of two or more tests.

(e) Discussion

If an opinion is in order, these scores constitute a rather normal pattern and conform to expectations, given some knowledge of factors in the schools and communities involved. While more than two test administrations are required to establish trends, a preliminary plotting indicates slightly better than

average growth patterns (in reading and mathematics) from the year one base-line results in both the open plan and their control schools. The "no significant difference" findings are consistent with the 1970-71 study results, and with most of the other studies of these schools to date.